Digital transformation in maritime

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SMN Tokyo 2026

Digital Transformation Research Programme

Pre 2014
2014 - 2016
2017 - 2019
2020 - 2022
2023 - 2025
Post - 2025
As shipping evolves we see...

Pre 2014 | 2014 - 2016 | 2017 - 2019 | 2020 - 2022 | 2023 - 2025 | Post - 2025

UNCLOS, MARPOL, SOLAS, MLC, COLREGS, ISPS, IMDG, IMSBC

ECAs

Rightship

Sire

TMSA

CDI

new regulation...

RISQ 3.2

Sire 2.0

2016 Adoption 2016

Mandatory IMO DCS

ECA, NOX, EEDI

2017 BWM

Convention in force

2020 0.5% Global

Sulphur Limit

EEDI, EEXI, CII

2025 EEDI

Phase 3

in effect

ETS | Fuel EU

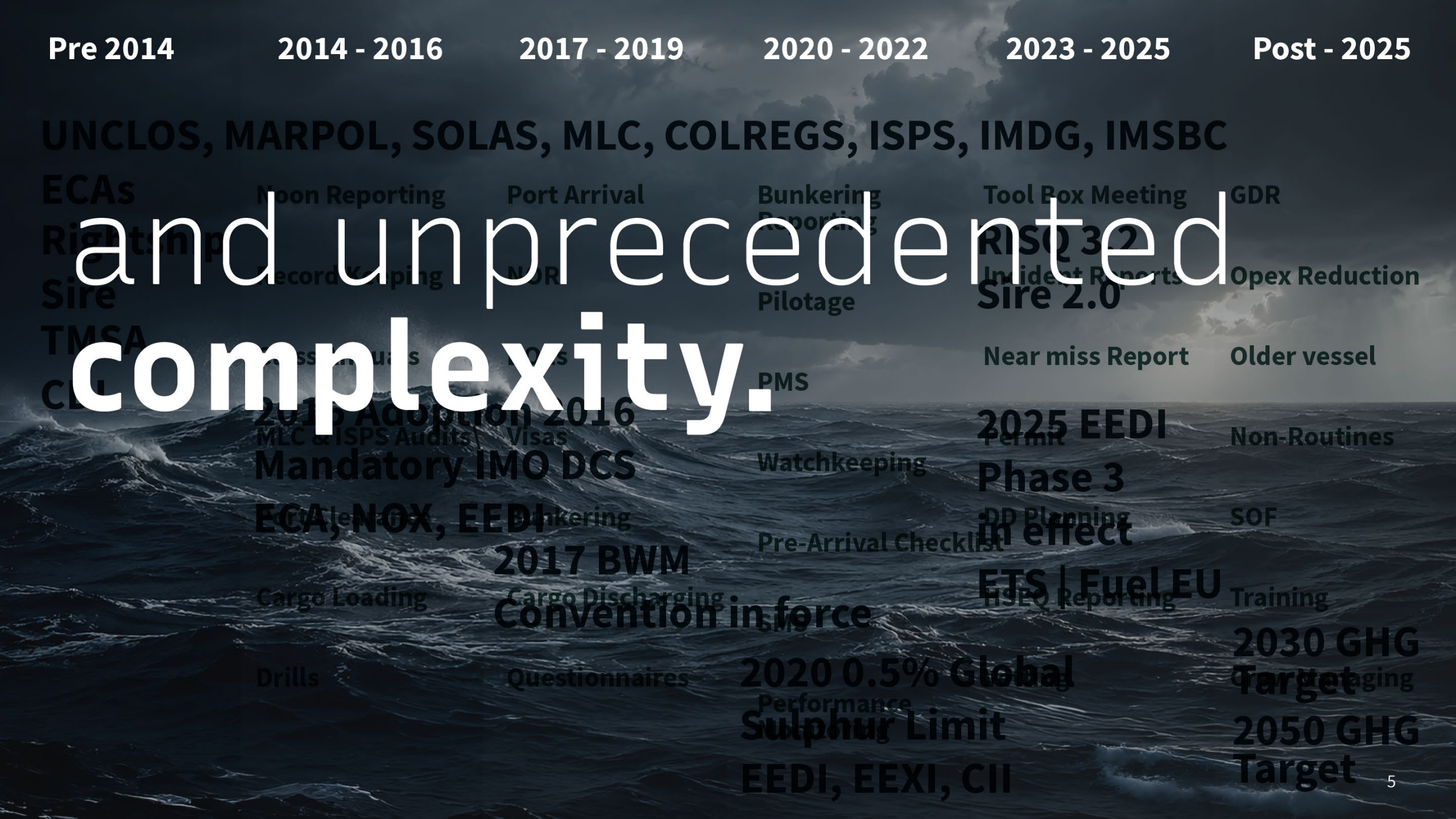
2030 GHG

Target

2050 GHG

Target

new responsibility...



and unprecedented

complexity.

Operators feel like they're drowning.

The impact of digitalisation

Deep dive into digital skills

110
experts from 20 countries

300+
Literature sources

2428
IMO documents

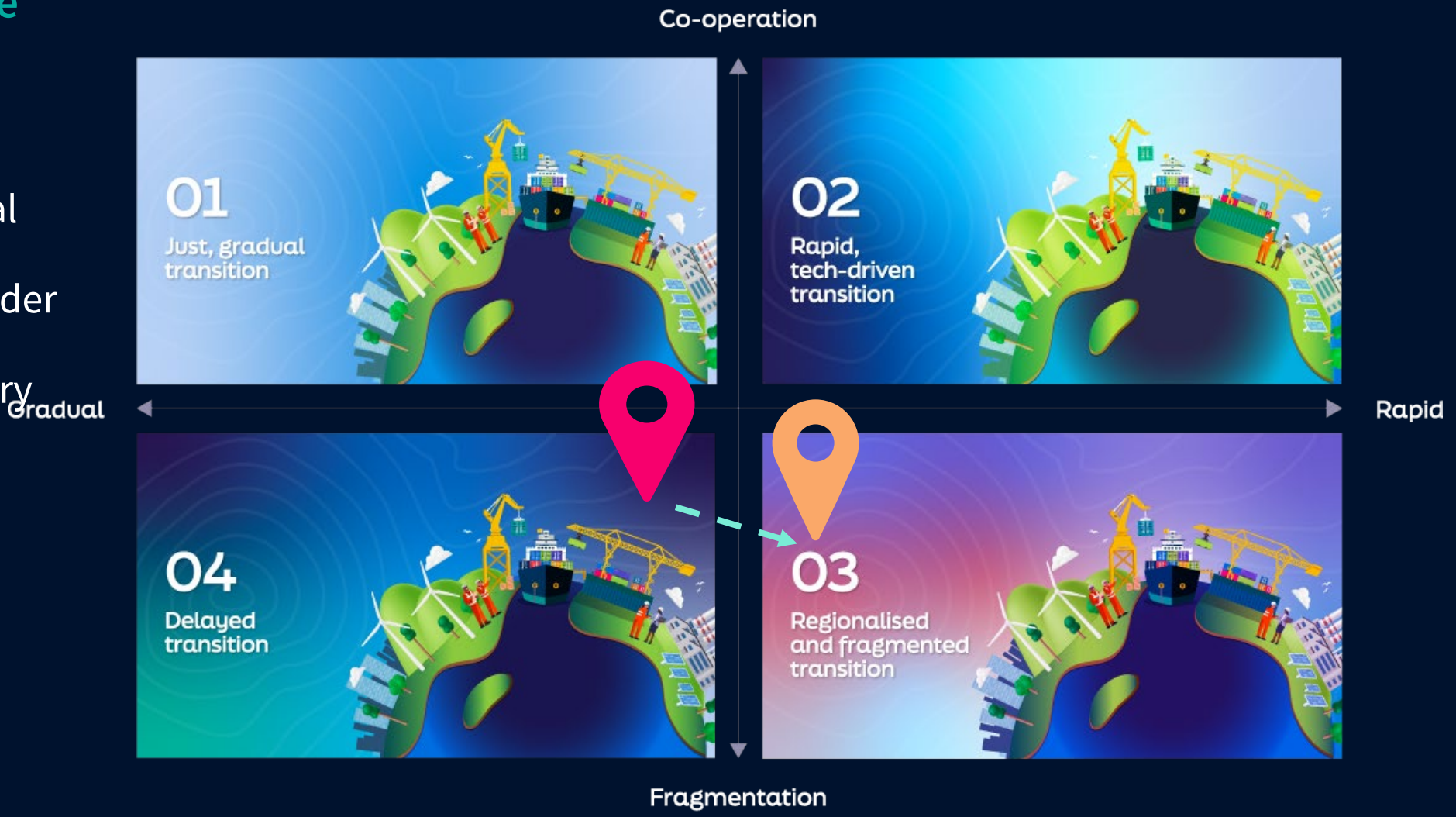
532
seafarers from 64 countries

Industry at key turning point

2026 Global Maritime Trends Barometer

Key challenges:

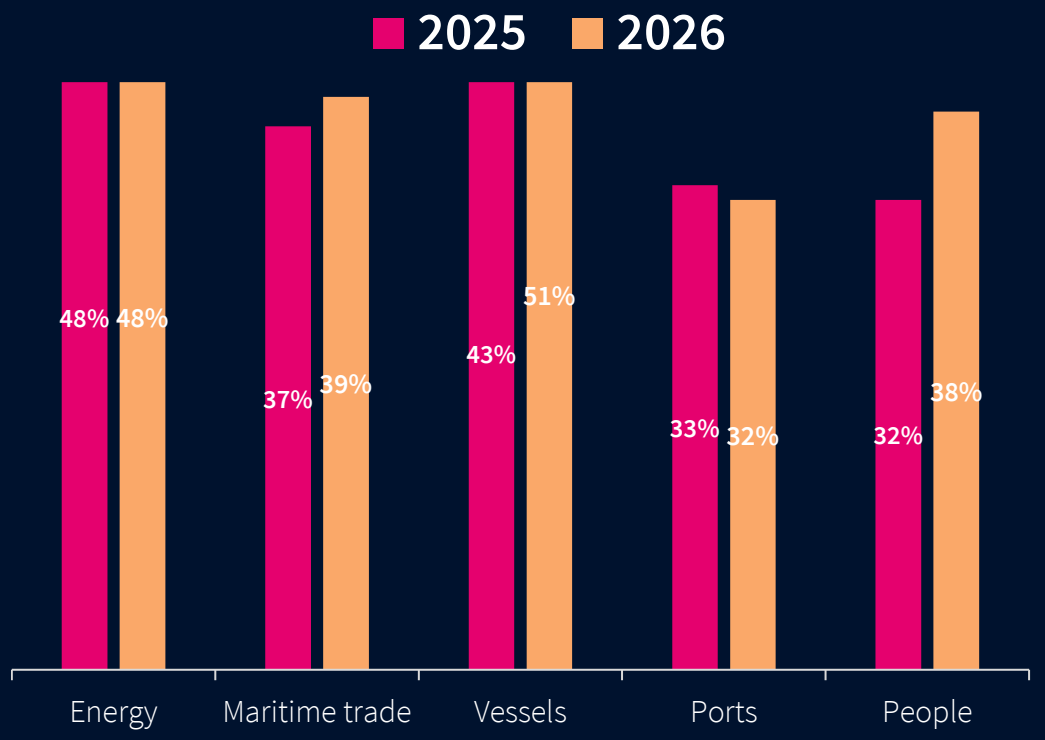
- limited technological adoption
- misaligned stakeholder interests
- insufficient regulatory frameworks



2025 2026

Digital transition barometer 2026

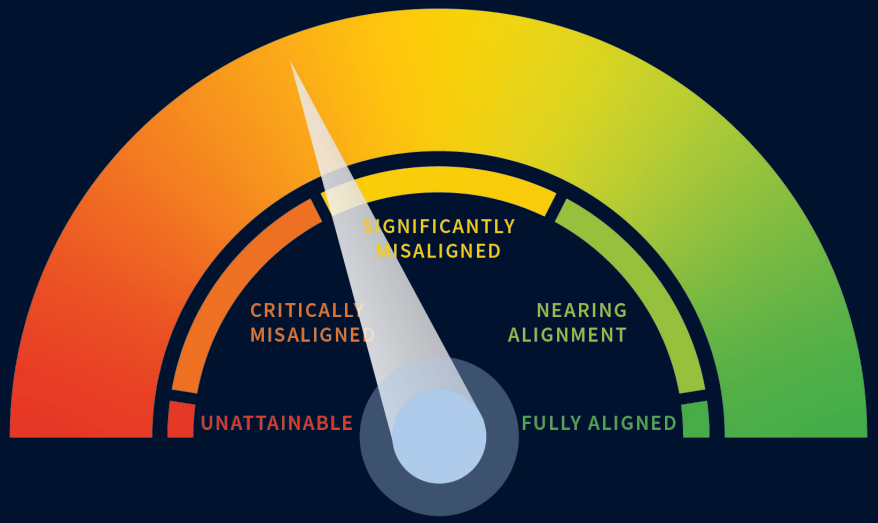
Energy	▶	48%
Maritime trade	▲	39% (2%)
Vessels	▲	51% (8%)
Ports	▼	32% (1%)
People	▲	38% (6%)



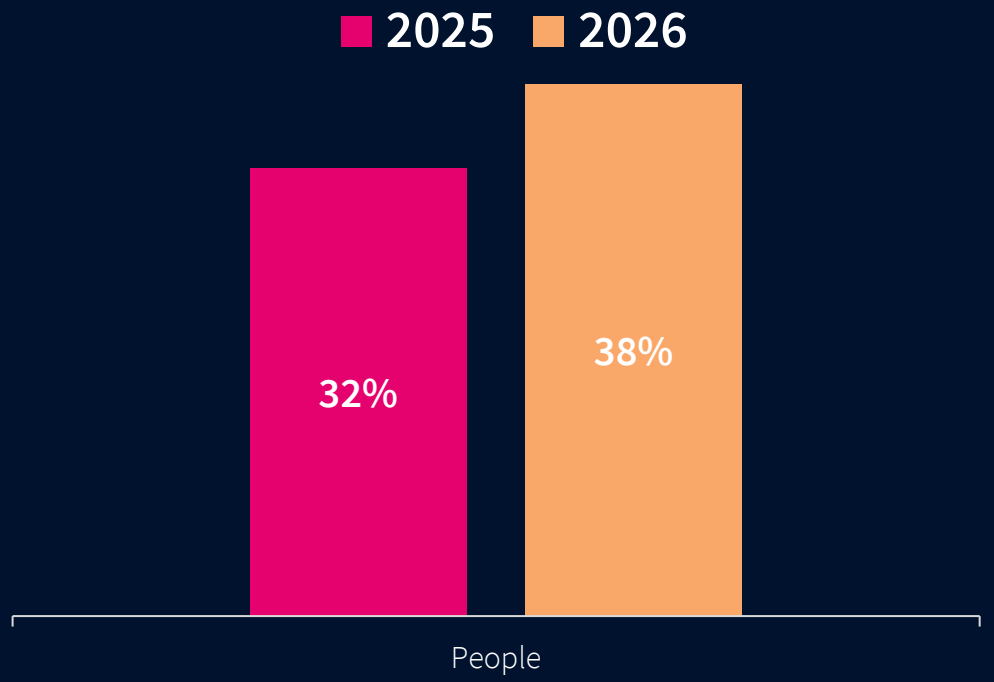
Lloyd's Register and Lloyd's Register Foundation (2026) Global Maritime Trends 2026 Barometer — Digital Transition scores.

People at 2026 Digital transition barometer

people as key enabler to digital transformation



38% ▲



Digital skills readiness in maritime

Seafarers are willing to upskill, but face significant training barriers

- ~67% would take part in digital upskilling programmes
- ~80% say shore-based training does not always match onboard systems
- ~72% say familiarisation time when joining a new vessel is not sufficient

Industry and regulators see widening capability gaps

- Cybersecurity, critical evaluation of digital outputs and language proficiency
- Career attractiveness, resources, alignment, resistance to change

Marine Education and Training Institutes are advancing, but key barriers constrain progress

- 51% say both staff and students lack basic digital skills
- 46% say budgets limit investment in technology
- 41% say curriculum and training challenges are a priority

Addressing the digital skills gap

Technology developers

Design for real operating and learning constraints; standardise systems.

International regulators

Set scalable baselines; modernise STCW for AI, cyber & remote operations.

Maritime Administrations

Build national frameworks; fund MET modernisation and equitable access.

Marine Education and Training

Embed digital skills; strengthen instructors, simulators & inclusive delivery.

Cross-stakeholder action

Connect policy and training feedback; balance traditional & emerging skills; coordinate STCW revision

Shipowners & operators

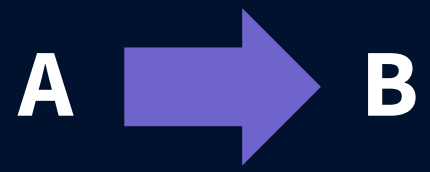
Make induction vessel-specific; build cyber culture; protect paid learning time.

Transition vs transformation

We cannot solve our problems with the same thinking we used when we created them.

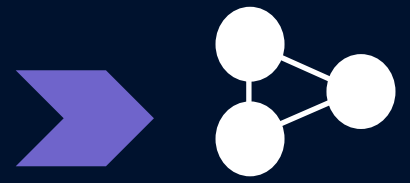
Albert Einstein

Transition



Process • tactical

Transformation



Strategy • culture • capabilities

Assurance helps organisations transform with confidence

Know where you are

Main Enablers

- Digital strategy
- Culture & Training
- Digitisation Standardization
- Connectivity
- Cloud storage/ computing
- Cyber security

+

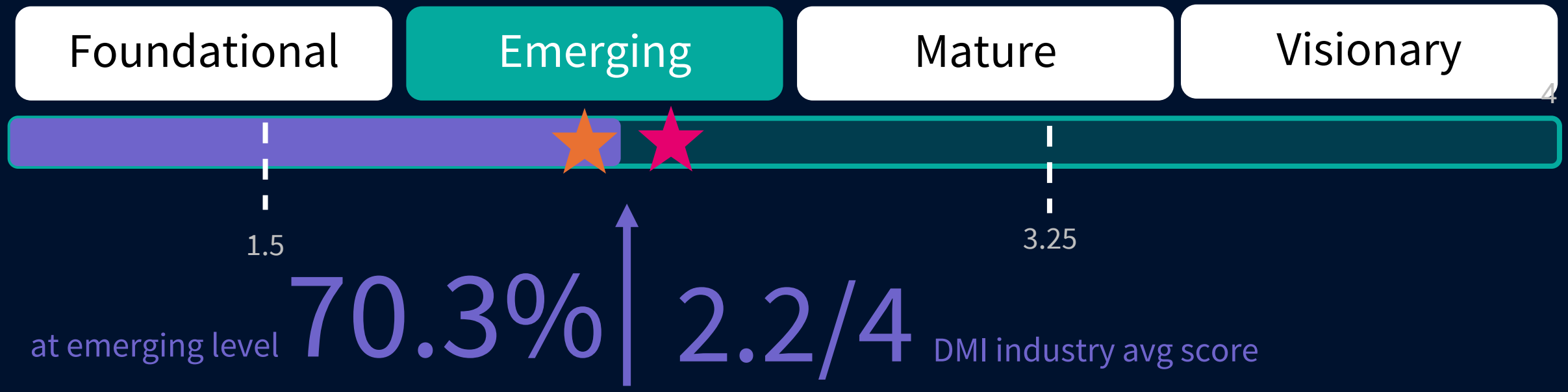
50+ maritime specific use cases

- Freight/ Chartering management
- Vessel technical management
- Crew management
- Trade execution
- Other support functions

Digital Maturity Index

Automation | Analytics / AI | IoT | AR/VR | Blockchain | Digital Twin

How digitally mature industry currently is?



Bulk carrier 2.0

2.3 tankers

Current benchmark

3.50/4

3.08/4

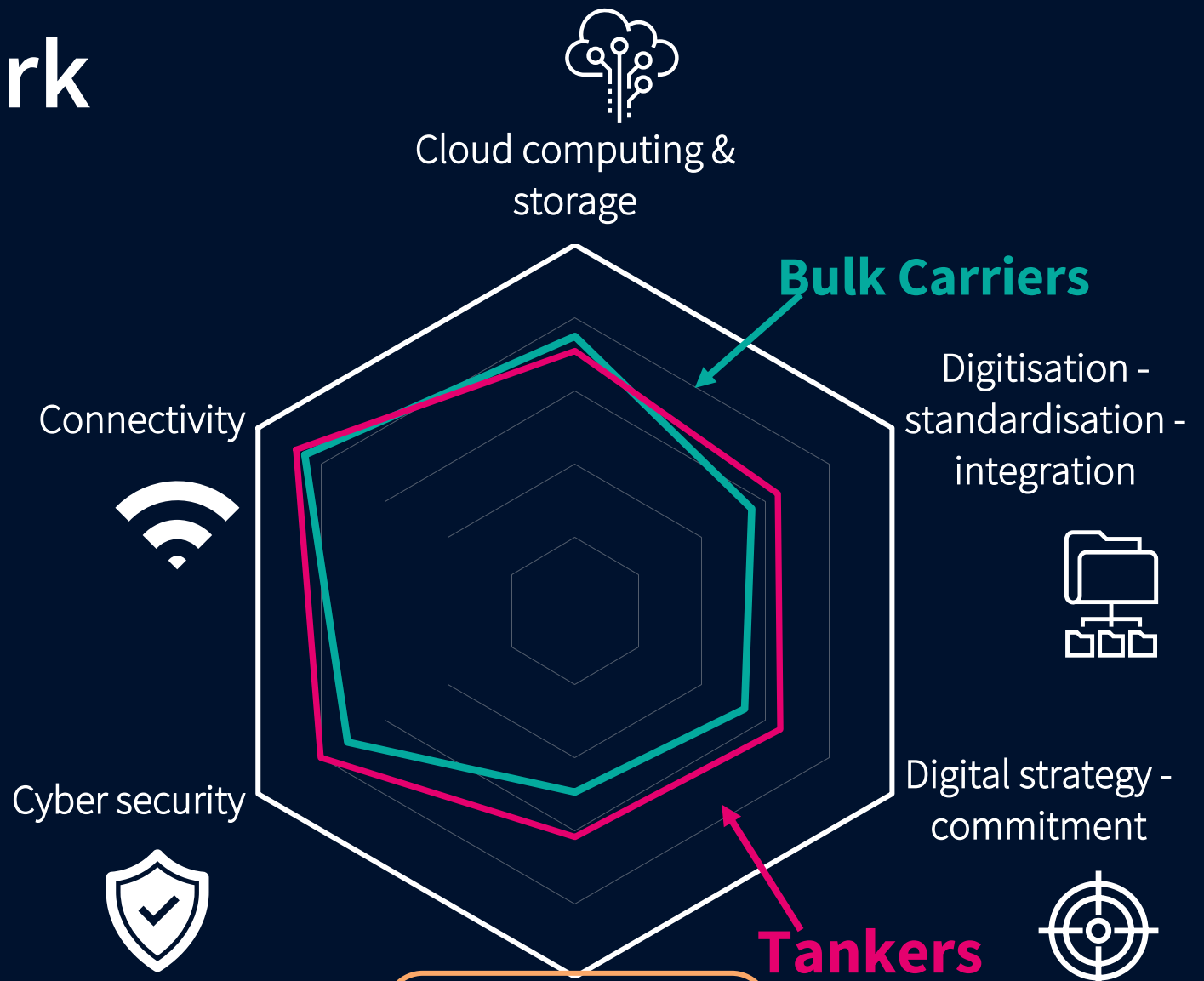
2.98/4

2.42/4

2.36/4

2.26/4

Industry averages

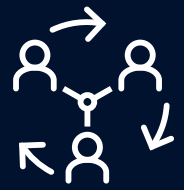


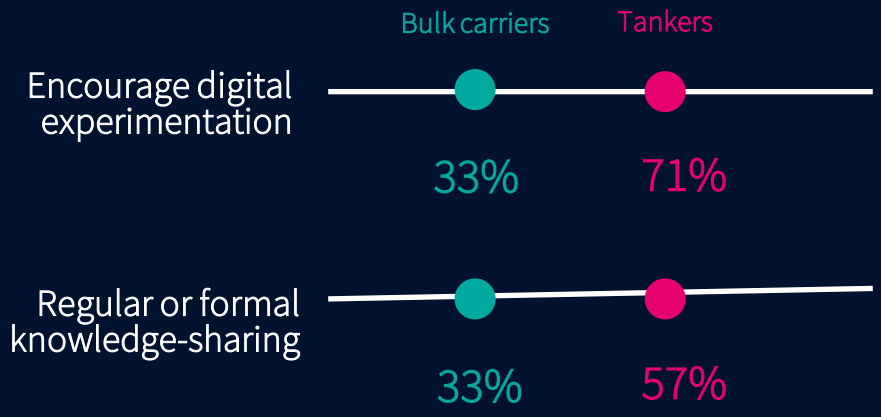
Culture is advancing faster than capability

72% invest 0.1% or less of revenue in digital training

20% have a structured process for testing and scaling digital initiatives

Culture & training





The most common use cases

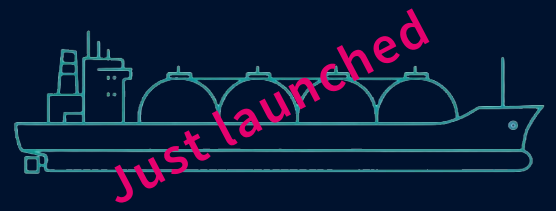
97%
Fleet tracking
Maturity 2.56

89%
Performance monitoring
Maturity 2.29

81%
ERP
Maturity 2.56

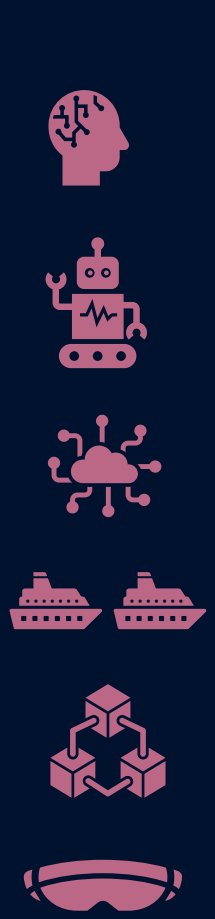
81%
Env monitoring & reporting
Maturity 2.13

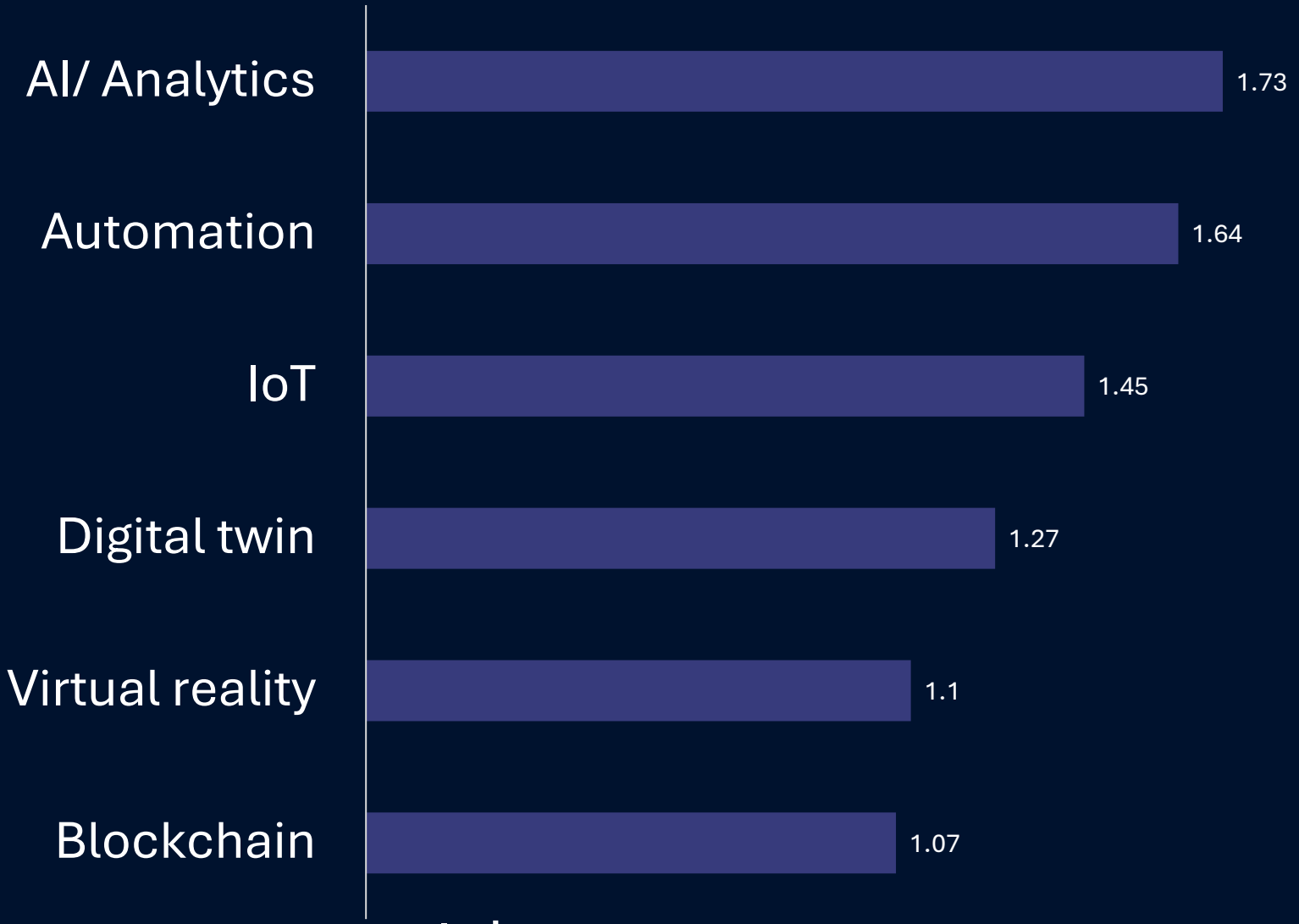
78%
Voyage analysis & optimisation
Maturity 2.40



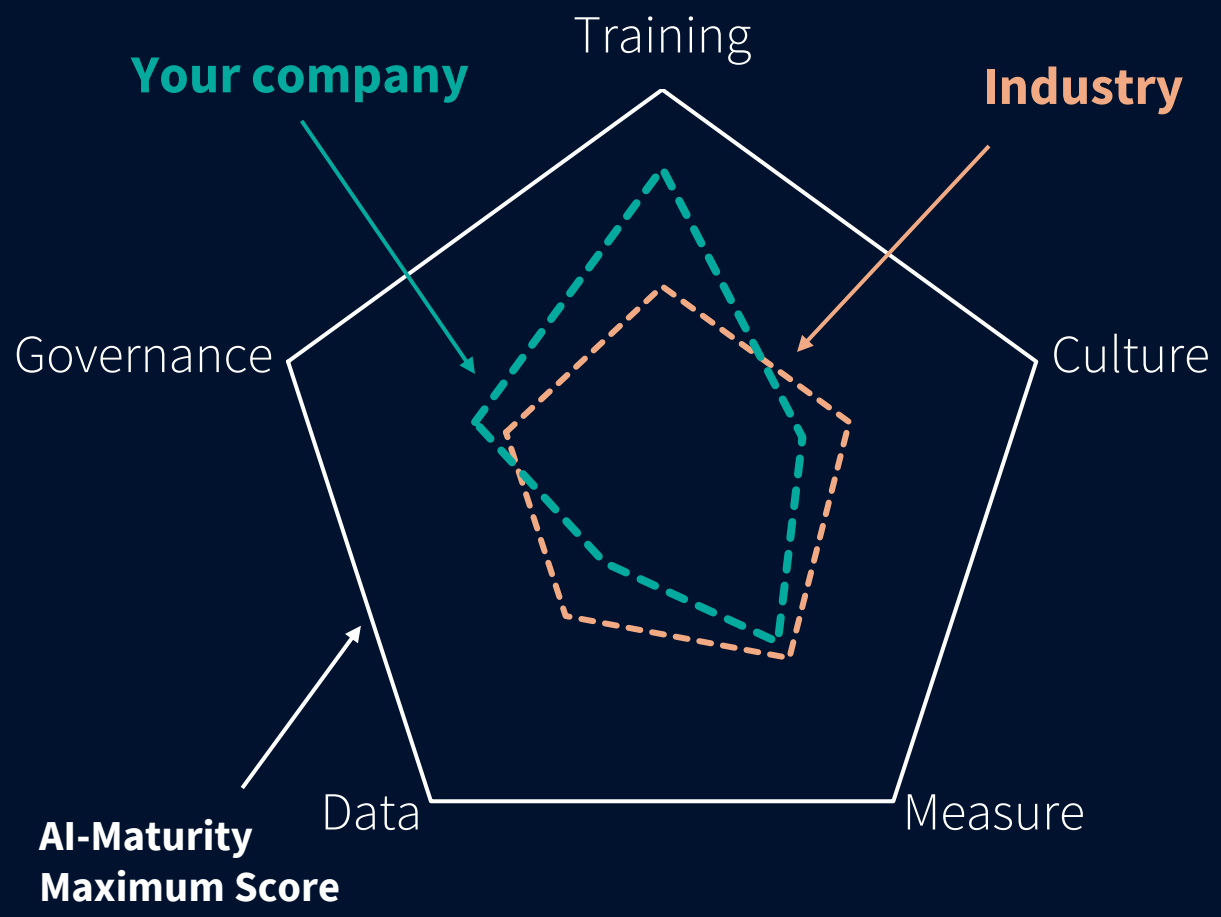
LNG use-cases

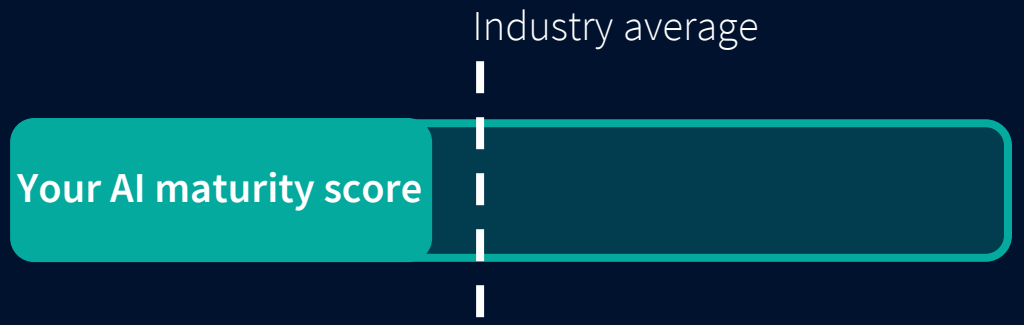
Technology adoption





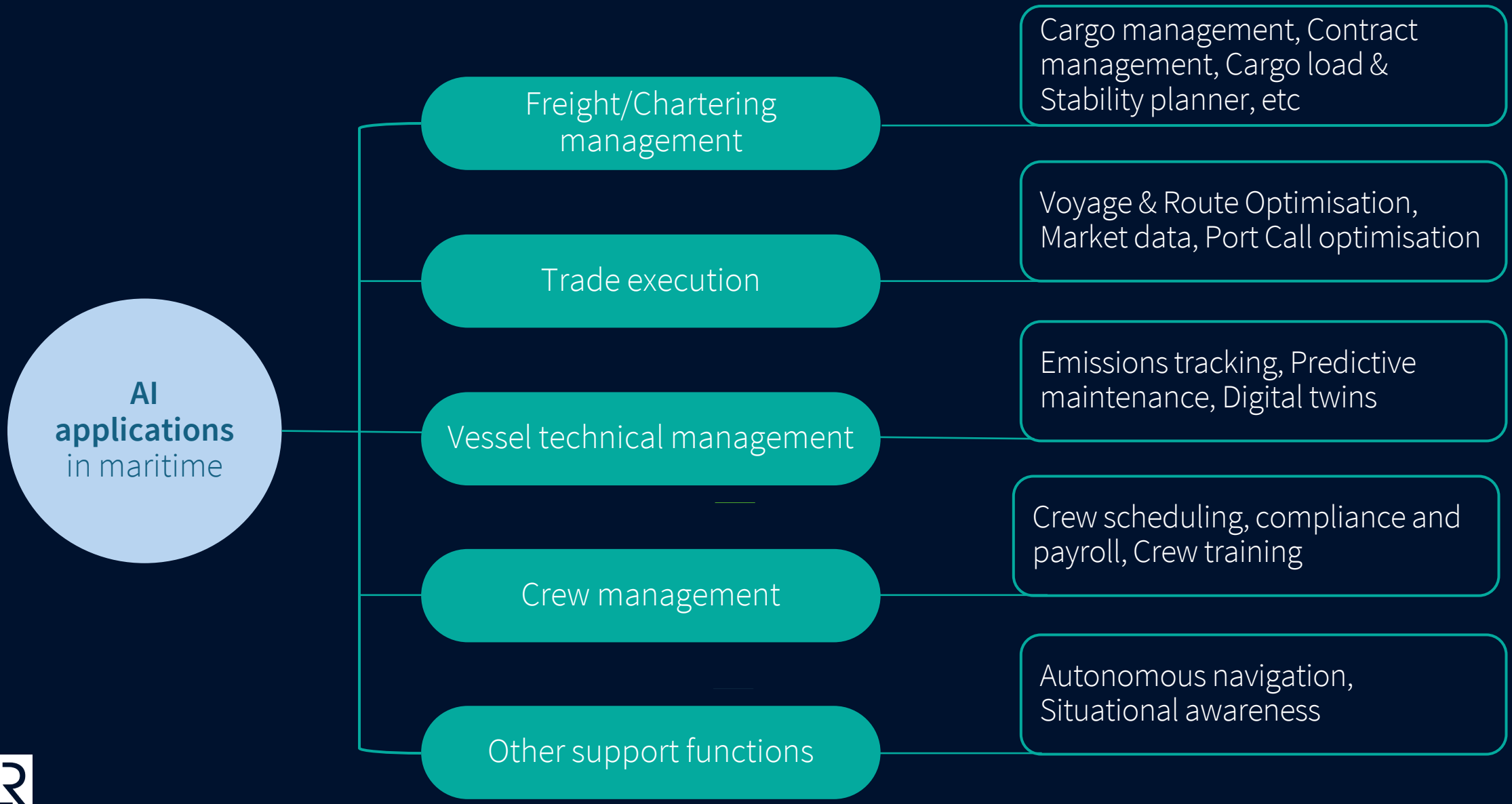
Beyond AI adoption





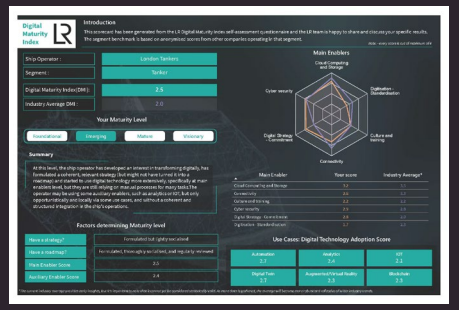
AI maturity survey

Beyond AI adoption – Example use cases



A structured approach to develop the Digital Transformation strategy

01 Self-assessment



Digital Maturity Index (DMI) Scorecard

02 Current state assessment & validation

- Validated DMI Scorecard
- Current state assessment Report

03 Benchmarking & Opportunity evaluation

- Digital benchmarking Report
- Opportunities evaluation Report

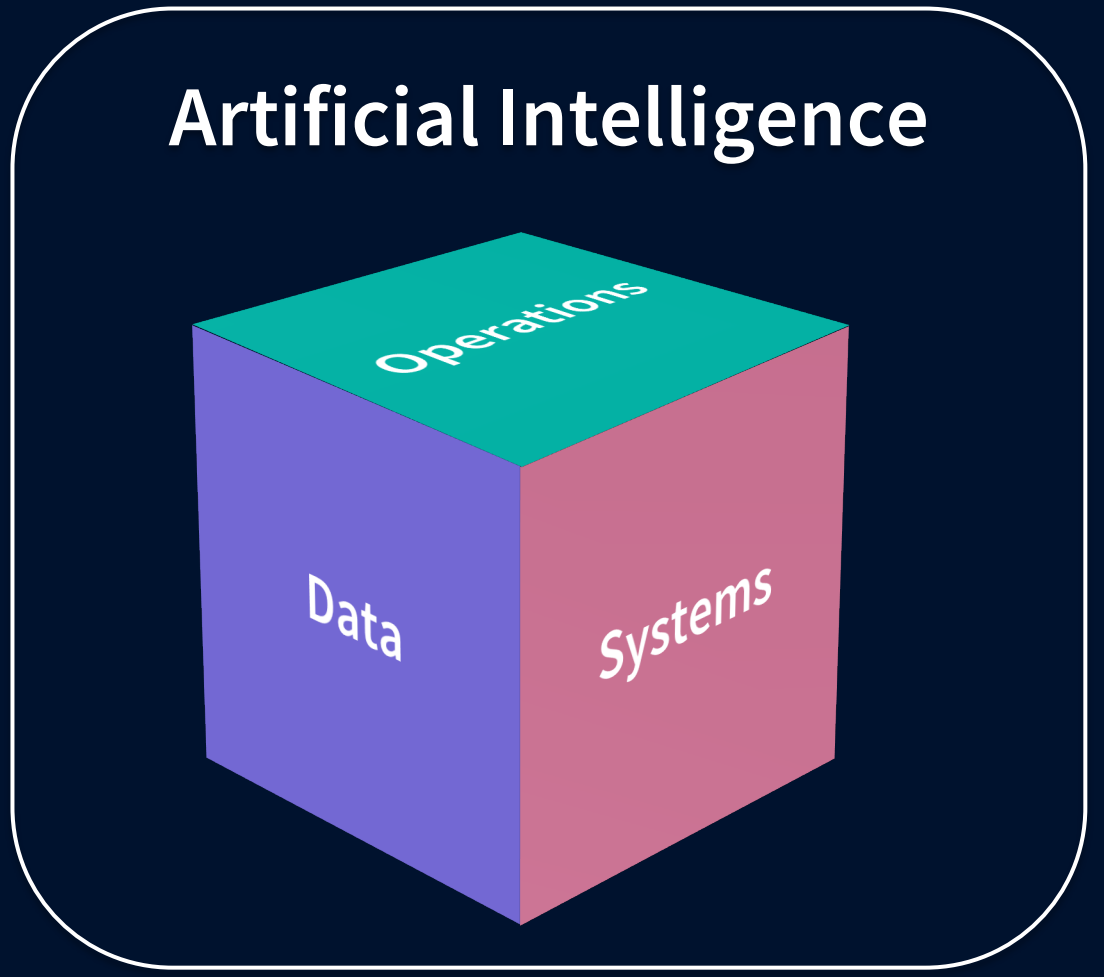
04 Digital strategy & roadmap

- Digital strategy
- Implementation roadmap

Maritime digital assurance framework

Continuous confidence at sea and on shore powered by AI, proven by Lloyd's Register.

Aligned with the IMO MASS code, as adopted at MSC 111, for Remote Operation Centre capability.



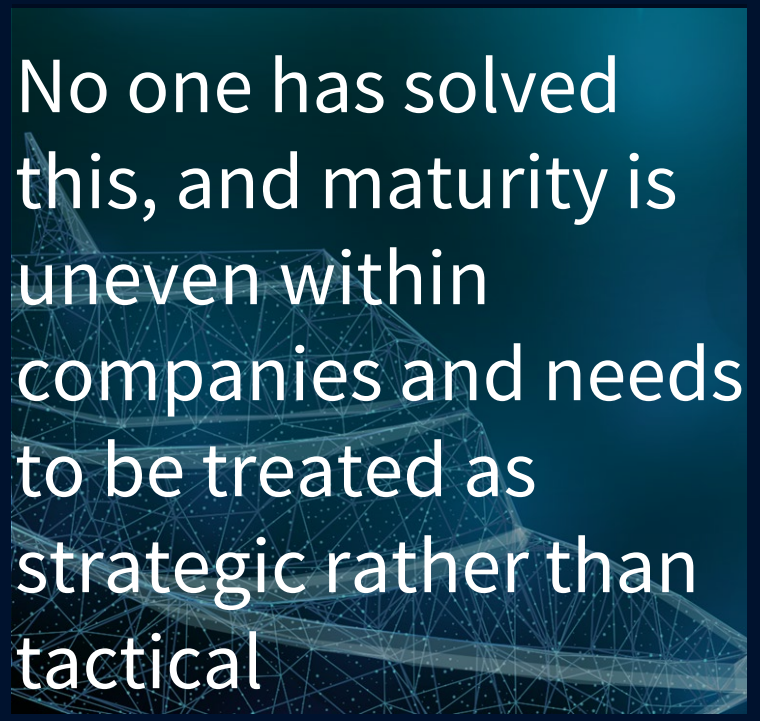
The power of three in digital transformation

Vessel | Voyage | People

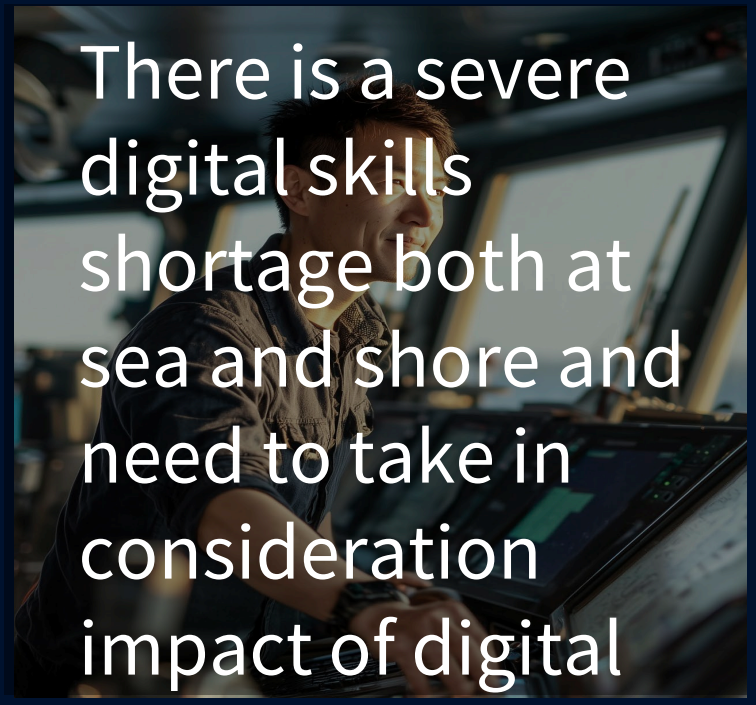
The power of three in digital transformation

Concluding thoughts

Digital transition in maritime still lags behind land-based industries however is showing signs of growth (GMT Barometer 2026)

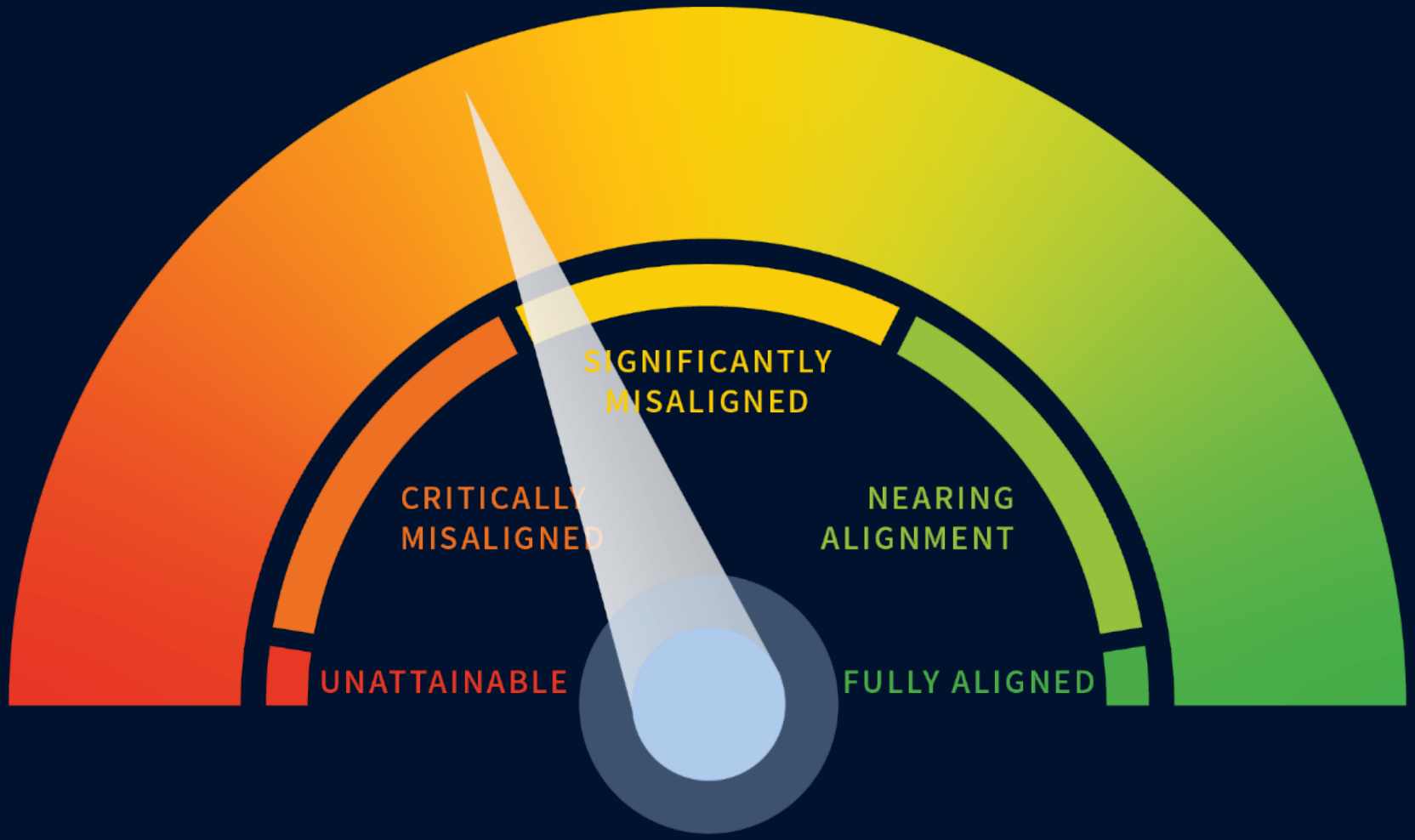


No one has solved this, and maturity is uneven within companies and needs to be treated as strategic rather than tactical



There is a severe digital skills shortage both at sea and shore and need to take in consideration impact of digital

Moving the dial



Thank you

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