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Practical cyber security challenges and opportunities in shipping

MASRWG Conference: January 2021

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Agenda

1. State of the Nation (Industry and LR): What has been happening?
2. Regulations: What's driving change?
3. Cyber Security Considerations: What do we need to be doing?
4. Q&A

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State of the Nation

What has been happening in Cyber recently? Landscape, regulations and Class

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Industry Drivers for Marine & Offshore

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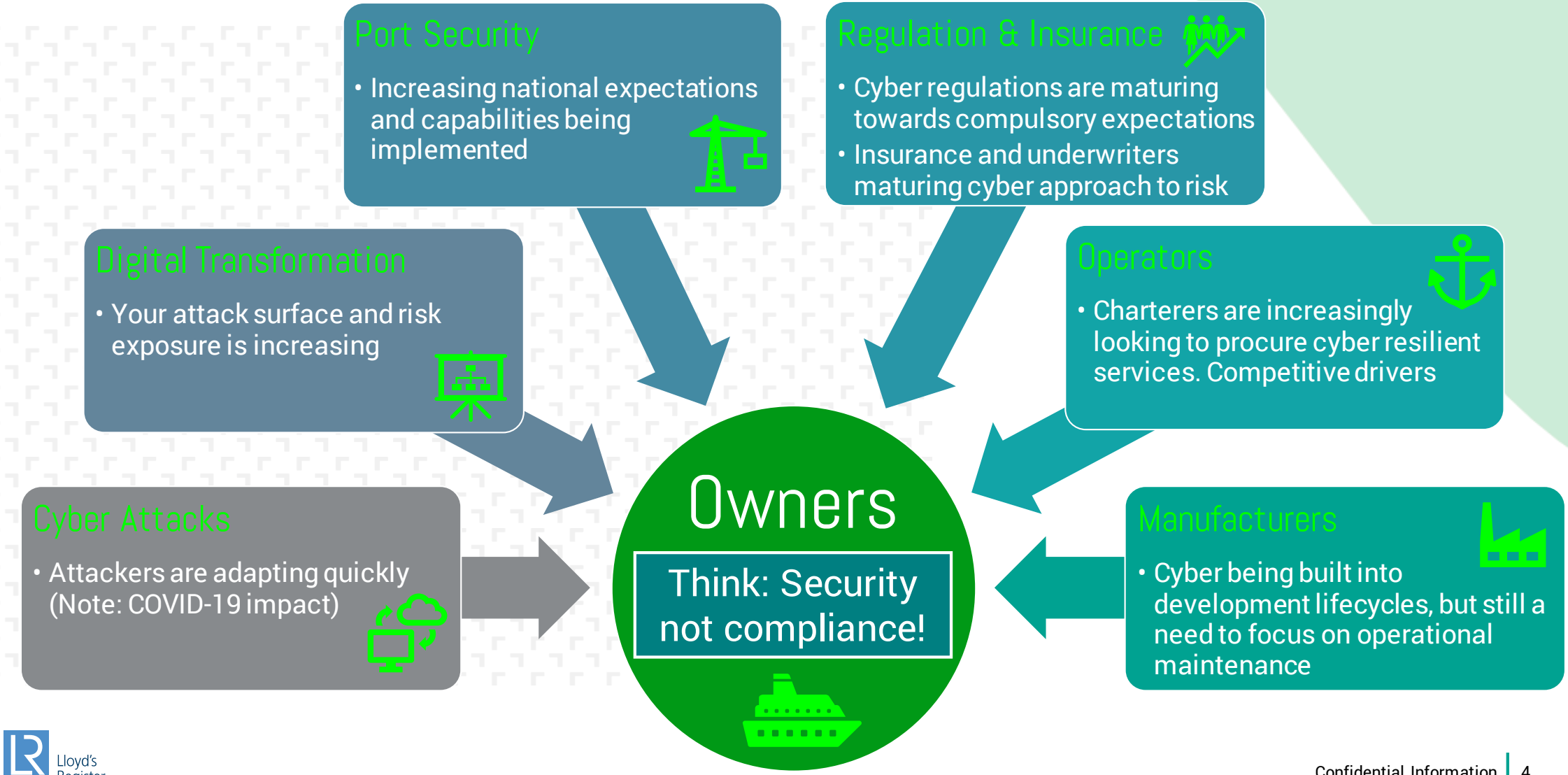

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New and Emerging Technology

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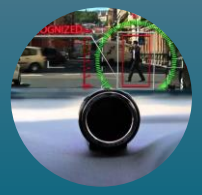
Drivers for the adoption of autonomous systems

Artificial Intelligence



Sensors and Situational Awareness

Connectivity

Digital Twins and Digital Health Management

Energy Management and Environment

Cyber Security

Cyber Security is impacted by each of these areas

Automation and Remote Connectivity

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Which is more important from a Cyber perspective?

- To allow automation often some level of remote connectivity is required
- They both present different considerations from an attack surface perspective

Remote Connectivity:	Automation:
The means by which a vessel can be remotely monitored, influenced and controlled	*The functions and actions that can be taken independent from live human decision*
AVAILABILITY OF SYSTEMS	INTEGRITY OF DATA

Risk levels are affected by levels of automation and remote connectivity

- Vessel automation is a long journey and starts with specific systems or platforms
- Systems are already today automated to some level, but with a crew who monitor and step in when required

Automation Journey

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Manual

All action and decision-making performed by human operator

On & Off-board Decision Support

All actions taken by human operator, but decision support tool can present options / influence the actions chosen. Data may be provided by systems on or off-board

Active Human in the loop

Decisions and actions are performed with human supervision. Data may be provided by systems on or off-board

Human in the loop as operator/ supervisor

Decisions and actions are performed autonomously with human supervision; operators have opportunity to intercede and over-ride on high impact decisions

Fully autonomous

Rarely supervised operation; decisions are entirely made and actioned by the system

Fully autonomous

Unsupervised operation; decisions are entirely made and actioned by the system during the mission.

Journey over time....

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Threat Surface

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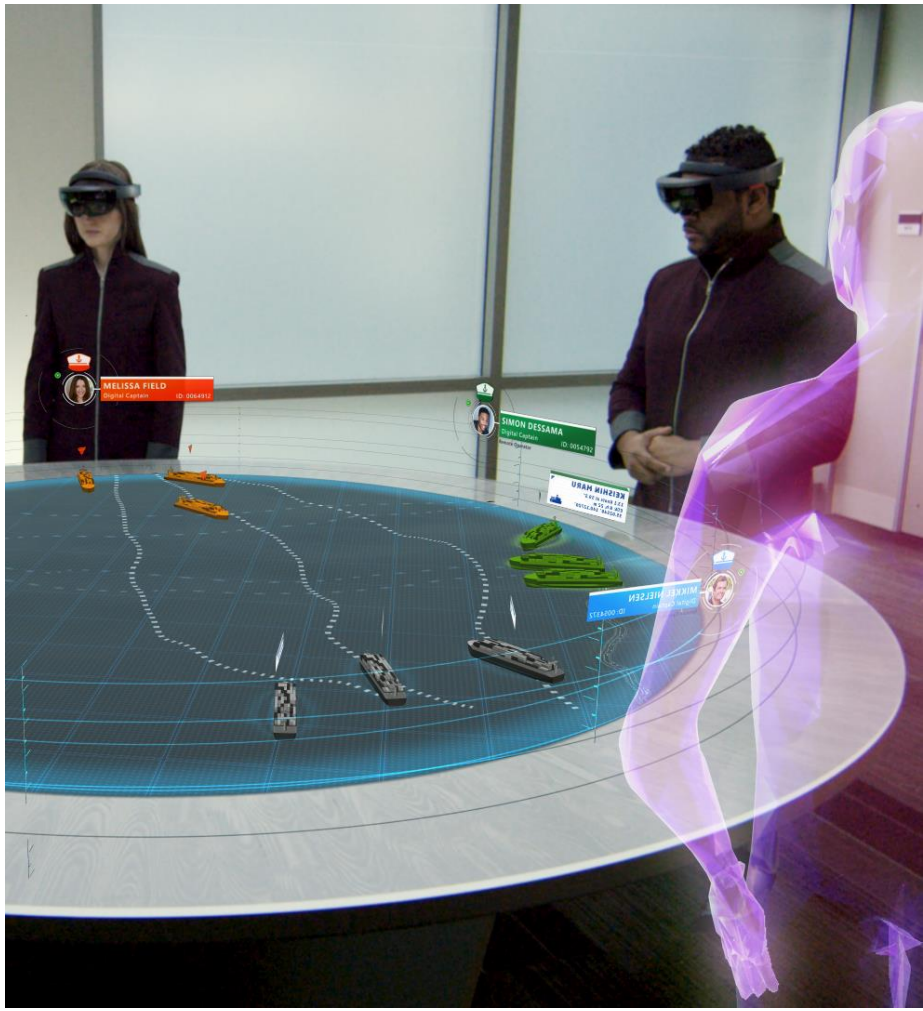
Automation accelerates the opportunity:

- Wider and more easily assessable interfaces from which to gain access
- More parties involved in the operational delivery of the service

Threat Motivations:

- Access to sensitive systems/data: Cyber espionage, ransomware, data leaks, personal data theft
- Ability to impact performance/operational availability: Influence the performance of operations, ransomware, DDOS
- Ability to misdirect: Cargo smuggling/stealing, terrorist attacks, disruption and chaos, attacks driven by specific social issue concerns



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Key Considerations

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Maturing Viewpoints:

- Vendor and System Integrators: Increased interest by equipment (hardware and software) manufacturers in applying and validating cyber security controls within their products. A lack of understanding around the services needed to maintain security and manage vulnerabilities post install/commission
- Remote Access: Understanding the cyber risks that are being faced. Many organisations need help to develop appropriate capability and manage these risk once faced
- Secure Software Development and Management: Ensuring that systems are built from the outset with security in mind. Ensuring that software is maintained, updated and security vulnerabilities are addressed in a timely manner

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Regulations and Drivers

Why should cyber be on the agenda? What regulations and industry bodies are driving change?

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What are Key Stakeholders doing about cyber?

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WHAT	International Maritime Organization (IMO)	National Governments	Industry Bodies	Class Societies	Owners & Operators
CYBER	MSC-FAL.1/Circ.3 Guidelines on maritime cyber risk management Resolution MSC.428(98) - Maritime Cyber Risk Management in Safety Management Systems	Flag State Requirements UK Maritime Security for Ports and Ship owners US Coastguard Cyber Guidelines	The Guidelines on Cyber Security Onboard Ships v3 (BIMCO) Tanker Management and Self Assessment (TMSA) (OCIMF)	ISM Code/SMS & DOC/SMC Audits IACS Recommendation on Cyber Resilience (No. 166) Class: LR ShipRight, LR Rules, Type Approvals LR Cyber Security Framework (CSF)	Plans and Procedures for Cyber Risk Management SSP (Ship Security Plan) as defined by ISPS

IMO INTERNATIONAL MARITIME ORGANIZATION

BIMCO OCIMF

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Regulation of Maritime Autonomous Surface Ship (MASS)

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First stage of the IMO regulatory scoping exercise

IMO
INTERNATIONAL MARITIME ORGANIZATION

- MASS is defined as a ship which, to a varying degree, can operate independently of human interaction.
- Autonomy levels were proposed for the purposes of assessing the applicability of existing regulations and identifying any that prevent MASS operations. Consideration of amended regulations will follow as a second stage.
- MSC.1/Circ.1604 Interim Guidelines for MASS Trials published in 2019 indicates the goal: "at least the same degree of safety, security and protection of the environment as provided by the relevant instruments" (EQUIVALENCE)
- It asks that risk management "should address the risks to safety, security and protection of the environment. The risks associated with the trials should be appropriately identified and measures to reduce the risks to as low as reasonably practicable and acceptable should be put in place"

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Cyber Security Considerations

What should you be considering?

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Selecting the right approach

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What response is needed to Cyber Resiliency?

Cyber Resiliency is NOT just about completing a risk register/management plan – Organisations should over time execute on that plan and address the risks

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What are the LR Cyber Security ShipRight Procedures?

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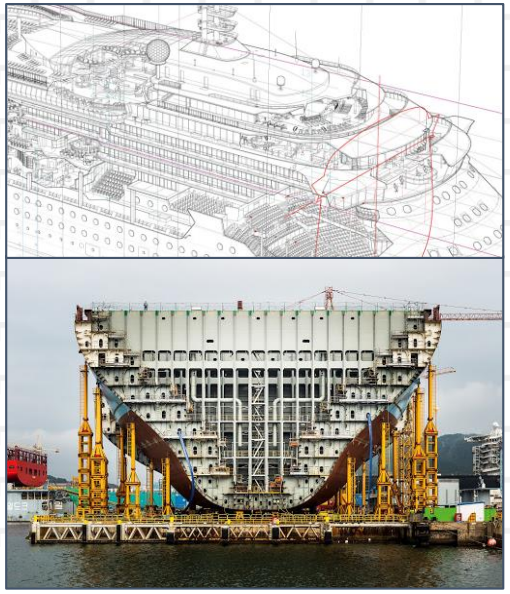
A set of requirements that, together with the LR Cyber Security Framework (LR CSF), are used to evaluate the approach and capabilities of marine and offshore organisations

Version 1.0: Published in Sept 2019 (Now withdrawn) – Single set of requirements covering 8 domains.

Version 2.0: Published under 3 documents aimed at different parts of a Ships Lifecycle:



LR Cyber Security ShipRight: Overview and Guidance

LR Cyber Security ShipRight for Design & Build

LR Cyber Security ShipRight for Operations

Class Descriptive Notes/Factual Statements

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Designed Capability vs Maturity

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The vessel and each system can be assessed against four levels:

4: Optimised	4: Optimised
3: Accomplished	3: Accomplished
2: Enhanced	2: Enhanced
1: Established	1: Established
Designed Capability *(Potential)*	Maturity *(Operating at)*

This vessel has the designed capability to operate at level 2-Enhanced but is actually operating at level 1-Established

4: Optimised	4: Optimised
3: Accomplished	3: Accomplished
2: Enhanced	2: Enhanced
1: Established	1: Established
Designed Capability *(Potential)*	Maturity *(Operating at)*

This vessel has the designed capability to operate at level 4-Optimised but is actually operating at level 2-Enhanced

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Guidance on Selecting a Capability/Maturity Level

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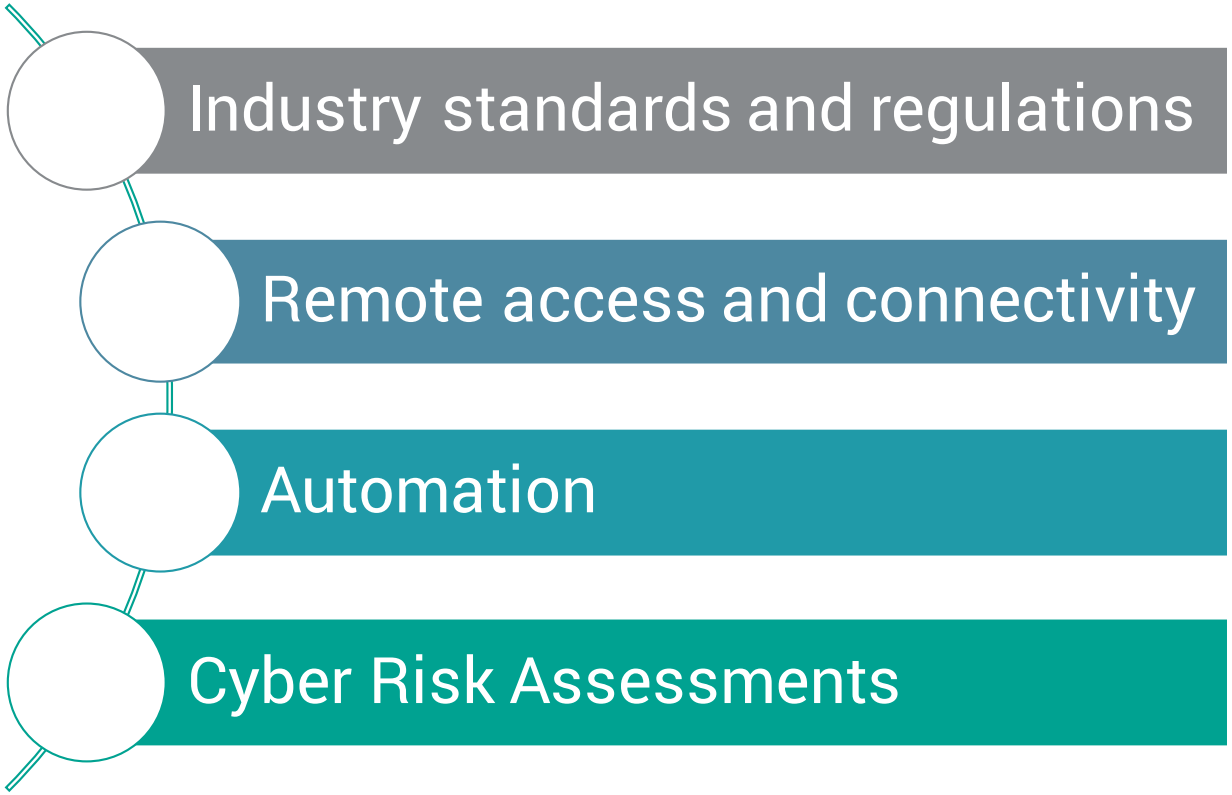
Guidance is given around four perspectives for selecting the right capability/maturity level for you:



- What designed capability/maturity level is right for your ship and/or the systems on board can be hard to instinctively know.
- 4 drivers have been identified
- The guidance is given to help you determine the right level to seek when designing and planning a vessel's security architecture, technology or configuration.

Final Thought….

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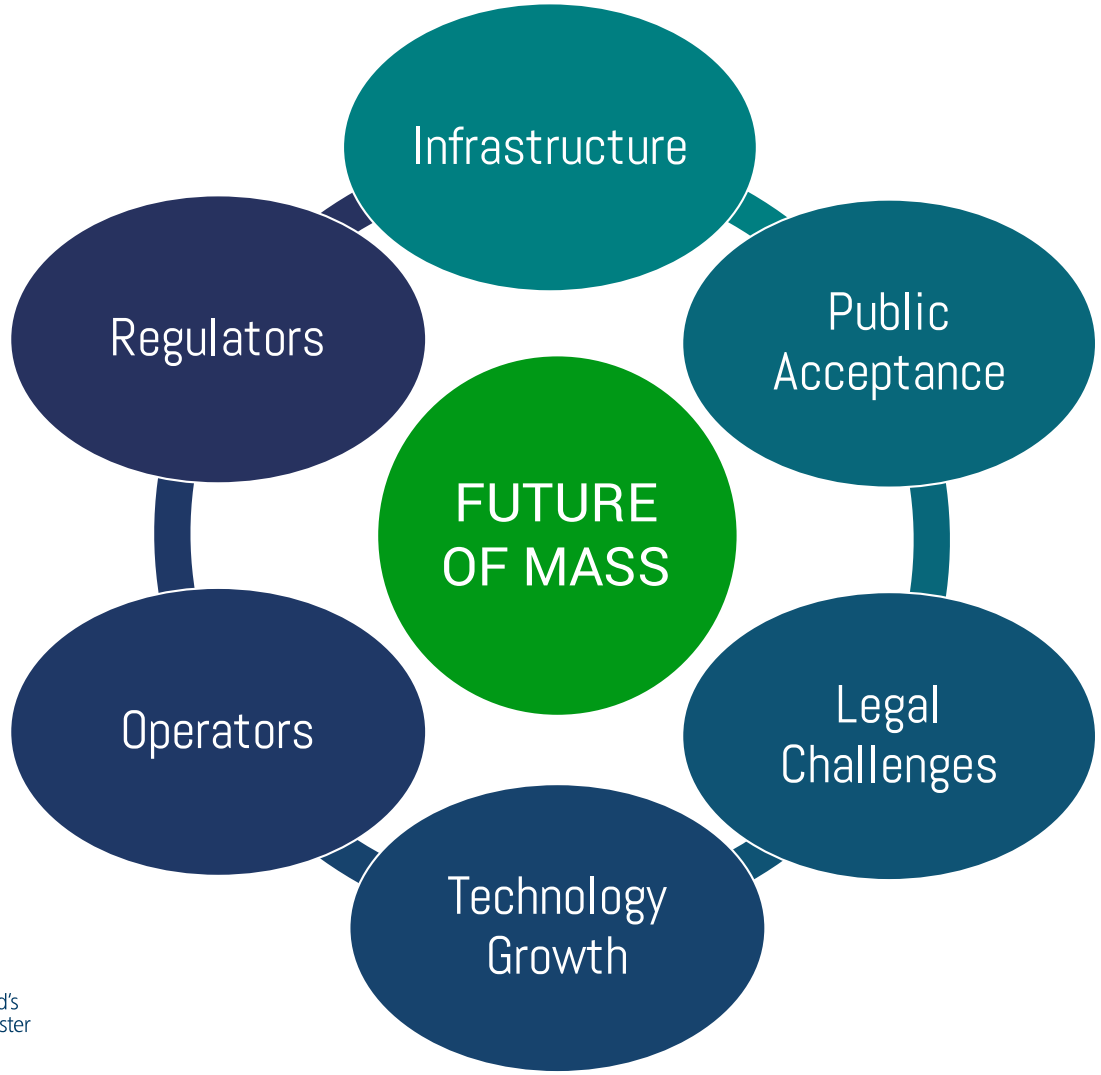
Need for Collaboration not Competition



- Marine and offshore is not the first industry to travel the automation route
- Knowledge sharing, collaboration and building on other more mature sectors is key

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Any Questions?

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Thank you

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